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## (54) VAPOR GROWTH METHOD FOR THIN SEMICONDUCTOR FILM

thickness is obtained, the substrate 2 is held in the second chamber 13 and cooled while protecting surface with  $\text{PH}_3$ .

## (57) Abstract:

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**PURPOSE:** To grow the titled thin film by adsorbing a group-III halide on a substrate crystal in an inert atmosphere, then absorbing a group-V element thereon in a reducing atmosphere, repeating the process, and controlling each growth layer at a high growth velocity.

**CONSTITUTION:** A reaction tube 1 consisting of the first chamber 12 and the second chamber 13 is provided with a substrate holder 15 to which an InP substrate 14, for example, is fixed and which can be inserted alternately into the two chambers through a bellows 19. A group-V halide (hereinafter referred to as  $\text{PH}_3$ ) for the second chamber and  $\text{H}_2$  as a reducing gas are charged into the second chamber 13 of the reaction tube, a group-III element 17 (hereinafter referred to as metallic In) put in a quartz dish is heated by a 2-zone furnace 16 to  $650\text{W}900^\circ\text{C}$ , and the substrate 14 is heated to  $500\text{W}800^\circ\text{C}$ . Then  $\text{N}_2$  as an inert gas,  $\text{PH}_3$ , and  $\text{HCl}$  are introduced into the first chamber 12, the formed  $\text{InCl}_3$  is adsorbed on the surface of the substrate 2, and then the substrate 2 is inserted into the second chamber 13 wherein  $\text{PH}_3$  is adsorbed in the reducing atmosphere. Subsequently, the substrate 2 is inserted alternately into the first chamber 12 and the second chamber 13 to epitaxially grow each monoatomic layer. After a desired

